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10/582,259	02/21/2007	Bertrand Leroux	Serie 6439	1319

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EXAMINER
NDUBIZU, CHUKA CLEMENT

ART UNIT	PAPER NUMBER
3743	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/582,259	LEROUX ET AL.	
	Examiner	Art Unit	
	CHUKA C. NDUBIZU	3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-26,29 and 30* is/are pending in the application.

4a) Of the above claim(s) *1-15,27 and 28* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-26,29 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Amendment filed on May 22 2009 is acknowledged.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 25 and 26 rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the third block being between first and second blocks and the first block having the limitation of claim 25 paragraph (a); does not reasonably provide enablement for the limitations in claim 25 paragraph (b) and (c). The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. It is not possible to have the first and second blocks on either side of the third block and the three orifices in the second and third blocks each being placed a distance of L2 from “the fuel injection orifice” of block 1. Claim 26 is rejected since it is dependent on claim 25.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 16-26 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugue et al 6,910,879 in view of Khinkis 4,761,132. Dugue teaches the invention as claimed (fig 1-6).

With regard to claim 16 Dugue discloses (fig 3) a jet of fuel and at least two jets of oxygen-rich oxygenated gas, the first jet of oxygen-rich oxygenated gas 28, called the primary jet, being injected so as to be in contact with the jet of fuel (column 7 lines 10-12) and so as to generate incomplete first combustion, the gases output by this first combustion still including at least one portion of the fuel, and the second jet of oxygen-rich oxygenated gas 27 being injected at a distance L1 (d1) from the jet of fuel so as to combust with a first portion of the fuel present in the gases output by the first combustion, wherein an oxygen-lean (column 4 lines 48-59) oxygenated gas (secondary) is injected (through 26) at a distance L2 (d2) from the jet of fuel so as to combust with a second portion of the fuel present in the gases output by the first combustion, and in that L2 is greater than L1 (see fig 3b).

Dugue does not specifically disclose that the primary jets inject oxygen-rich oxygenated gas even though he suggests that (see column 3 lines 46-52).

Khinkis discloses an oxygen enriched combustion system (fig 1) wherein oxygen-rich gas is first provided for sub-stoichiometric combustion of the fuel (column 3 lines 46-51) before the fuel is further reacted with oxidizer (see fig 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dugue's invention by using oxygen-rich oxygenated gas for the primary sub-stoichiometric combustion in order to provide a furnace with enhanced efficiency and reduced NOx emission as taught by Khinkis (column 1 lines 10-13).

With regard to claim 17 Khinkis also discloses wherein the oxygen-rich oxygenated gas has an oxygen concentration of greater than 30% by volume (column 3 lines 46-48).

With regard to claim 18 Dugue also discloses wherein the oxygen-lean oxygenated gas has an oxygen concentration of at most 30% by volume (less than 30%) (column 4 lines 48-59).

With regard to claim 19 Dugue also discloses wherein the distance L1 is between 5 and 20 cm (d1 < 30 cm) (column 3 lines 5-7).

With regard to claim 20 Dugue also discloses wherein the distance L2 is greater than 30 cm (d2 < 63 cm, derived from data in column 3 lines 29-31, 35-38).

With regard to claim 21 Dugue also discloses wherein the quantity of oxygen injected by the jets of oxygen-rich oxygenated gas represents 10 to 50% of the total quantity of oxygen injected (column 3 lines 46-51).

With regard to claim 22 Dugue does not specifically discloses that the area of the cross section of the injection orifice for the oxygen-lean oxygenated gas is between 4 and 100 times the area of the injection cross section for the oxygen-rich oxygenated gas injected at the distance L2. However, figs 3a and 3b show clearly that the diameter of oxygen-rich orifice 32 is much smaller than the diameter of the oxygen-lean orifice 38. Therefore the area of the cross section of the injection orifice for the oxygen-lean oxygenated gas is much larger than that of the oxygen-rich oxygenated gas injection orifice at the distance L2. The limitation that the oxygen-lean oxygenated gas injection orifice area to be between 4 and 100 times the injection cross section area of the oxygen-rich gas is deemed a matter of design choice. Applicant has failed to disclose the significance of the range "between 4 and 100 times".

With regard to claim 23 Dugue also discloses wherein the oxygen-lean oxygenated gas is preheated before being injected (column 4 lines 49).

With regard to claim 29 Khinkis also discloses using the method of claim 16 for heating a glass charge or for a reheat furnace (column 3 lines 1-2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dugue's invention by using using the method of claim 16 for heating a glass charge in order to provide a furnace with increased heat transfer to the furnace load and reduced NOx emission as taught by Khinkis (column 1 lines 10-13).

With regard to claim 30, the method of claim 16 is capable of being used when a continuous production of oxygen is interrupted or when the production is not interrupted. It is within the purview of one of ordinary skill in the art to use bottled oxygen when the

production of oxygen is interrupted and to use oxygen from the production line when the production of oxygen is not interrupted. For example Koppang (US 5,759,022) discloses the use of bottled liquid oxygen in a combustion system (fig 3), oxygen from an oxygen production line can also be used in this set-up by connecting the line to the compressor 41 when the liquid line is not used.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dugue in view of Khinkis and further in view of Koppang et al 5,759,022. Dugue in view of Khinkis teaches the invention as claimed and as discussed above except for the oxygen-rich oxygenated gas being derived at least partly from a liquid oxygen storage unit.

Koppang discloses a combustor wherein the oxygen-rich oxygenated gas is derived at least partly from a liquid oxygen storage unit 38 (fig 3A).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Dugue in view of Khinkis's invention by including the use of liquid oxygen from a storage unit in order to provide a means of stocking large quantity of oxygen which can be easily replenished to minimize production interruption.

With regard to method claims 16-24 and 29-30 through the normal use and operation of Dugue in view of Khinkis and further in view of Koppang's invention discussed above the limitation of method of use recited in claims 16-24 and 29-30 will inherently be met.

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugue. Dugue teaches the invention as claimed (fig 5 and 6).

With regard to claim 25 Dugue discloses a burner assembly consisting of a third block (at 306) surrounded, in order, on each side by a first block (on the right) and a second block (on the left), in which: (a) the first block has a fuel injection orifice and at least two oxygenated-gas injection orifices, the first oxygenated-gas injection orifice 305 being placed so as to be in contact with the fuel injection orifice 304, the second oxygenated-gas injection orifice 303 being placed at a distance L1 from the fuel injection orifice; (b) the second block (on the left) has at least third 203 and fourth 206 oxygenated-gas injection orifices, the third is a distance L1 and the fourth is a distance L2 from the fuel injection orifice of the second block 205 , L2 being greater than L1 (see fig 6) and the fourth oxygenated-gas injection orifice having an area of between 4 and 100 times the area of the third orifice is deemed a matter of design choice as explained below and (c) the third block (at the middle) has a fifth oxygenated-gas injection orifice 306 placed at a distance L2 from the fuel injection orifice (see fig 6) .

Dugue does not specifically discloses that the area of the cross section of the injection orifice for the oxygen-lean oxygenated gas is between 4 and 100 times the area of the injection cross section for the oxygen-rich oxygenated gas injected at the distance L2. However, figs 3a and 3b show clearly that the diameter of oxygen-rich orifice 32 is much smaller than the diameter of the oxygen-lean orifice 38. Therefore the area of the cross section of the injection orifice for the oxygen-lean oxygenated gas is much larger than that of the oxygen-rich oxygenated gas injection orifice at the distance

L2. The limitation that the oxygen-lean oxygenated gas injection orifice area to be between 4 and 100 times the injection cross section area of the oxygen-rich gas is deemed a matter of design choice. Applicant has failed to disclose the significance of the range "between 4 and 100 times".

The limitations of claim 25 (b) and (c) as recited above and met by Dugue would be fully enabled unlike the applicant's recitation in claim 25 (b) and (c).

With regard to claim 26 Dugue also discloses wherein the first oxygenated-gas injection orifice is placed centrally in the fuel injection orifice (column 8 lines 28-30).

Response to Arguments

Applicant's arguments with respect to claims 16-30 have been considered but are moot in view of the new ground(s) of rejection. Dugue does not specifically disclose that the primary jets inject oxygen-rich oxygenated gas even though he suggests this (see column 3 lines 46-52 where he indicates that the bulk of the oxygen required in the fuel combustion is supplied by the primary oxidizers).

Khinkis discloses an oxygen enriched combustion system (fig 1) wherein oxygen-rich gas is first provided for sub-stoichiometric combustion of the fuel like it is done in the current application (column 3 lines 46-51) before the fuel is further reacted with more oxidizer (see fig 1). Dugue's invention can be modified by using oxygen-rich oxygenated gas for the primary sub-stoichiometric combustion in order to provide a furnace with enhanced efficiency and reduced NOx emission as taught by Khinkis

(column 1 lines 10-13). Dugue discloses that the secondary oxidizer could be oxygen-lean (for example 5% oxygen by volume column 4 lines 52-53).

With regard to claim 20 Dugue also discloses wherein the distance L2 is greater than 30 cm (using information from column 3 lines 29-31, 35-38 one would obtain d2 (L2) < 63 cm, and this meets the limitations).

With regard to claim 22 calculation based on information in column 3 lines 8-10, 29-32 of Dugue reveal that area (oxygen-lean) > 17 times area (oxygen-rich).

With regard to claims 25-26, 29-30 Dugue discloses the limitations as discussed above. With regard to claim 25, claim 25 (a) is enabling while the (b) and (c) part are not enabling as discussed above. The rejection of claim 25 is based on the assumption of what is enabling in 25 (b) and (c).

Conclusion

The prior art made of record in the attached USPTO 892 and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHUKA C. NDUBIZU whose telephone number is (571)272-6531. The examiner can normally be reached on Monday - Friday 8.30 - 4.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Rinehart can be reached on 571-272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chuka C Ndubizu/
Examiner, Art Unit 3743

/Kenneth B Rinehart/
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